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# PATENT ABSTRACTS OF JAPAN

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(71)Applicant : BROTHER IND LTD

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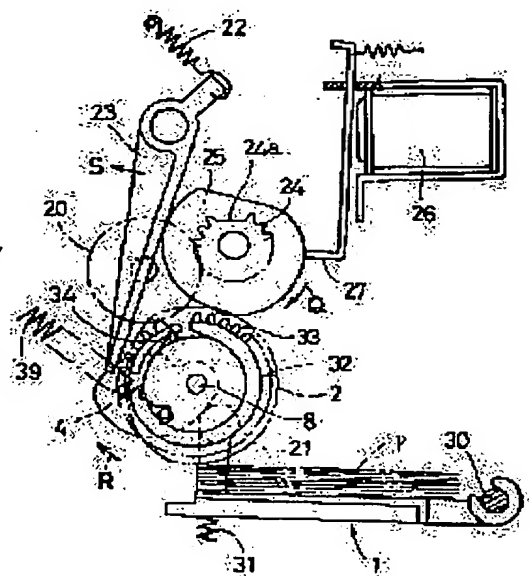
(72)Inventor : ISHII AKIRA

## (54) PAPER FEED DEVICE

### (57)Abstract:

**PURPOSE:** To prevent an adverse influence on a printed image by preventing impact force and unevenness of rotation due to the force of an energizing means, which pushes up a paper tray in a paper feed device, from transmitting to the inside of a transmission gear mechanism.

**CONSTITUTION:** A clutch body 32 provided with a partially toothless gear 33 to be engaged with one idler gear 20 in a transmission gear mechanism, and a cam 4 for pushing a paper tray 1 downward against the force of an energizing means 31 which presses the paper tray 1 upward, are rotatably provided on a supporting shaft 8 respectively, and the cam 4 and the clutch body 32 are stationarily and engagingly locked by a locking claw 23. When the locking claw 23 is disengaged from the cam 4 and the clutch body 32, the cam 4 is freely rotated independently by the energizing means 31, and at about the same time, when the partially toothless gear 33 of the clutch body 32 engages the idler gear 20 to be rotated regularly, the cam 4 and the clutch body 32 are integrally rotated by one revolution through an engaging projection body 39 provided on the cam 4.



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CLAIMS

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[Claim(s)]

[Claim 1] A form base loading a print sheet, and an energization means to energize a form base so that a print sheet on the form base may approach toward a feed roller, A cam which moves a form base in the direction which resists this energization force and a print sheet estranges from a feed roller, It has a conveyance roller pair prepared in the direction downstream of a form feed from a feed roller, and a transmission gear device in which turning effort of a drive motor is transmitted to a conveyance roller pair and said cam. In feed equipment which constitutes and becomes so that a print sheet which was made to move in the direction in which a print sheet approaches a feed roller in an operation of an energization means by rotation of a cam in a form base, and was sent out with a feed roller may be supplied to said conveyance roller pair A clutch object in which a toothless gear which is prepared pivotable on said cam and same axle, and meshes on one idler gear in said transmission gear device was formed, A stop means to suspend a clutch object in a location where said toothless portion counters with an idler gear, Feed equipment with which it is prepared between said cams and clutch objects, and a clutch object is suitably characterized by only an angle establishing an engagement means by which both are engaged so that it may rotate freely and may rotate in one with a cam after that to a cam.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the feed equipment in a printer etc., and relates to the structure of the feed equipment constituted so that the power transfer of the device which separates and supplies one sheet of print sheet at a time, and the form conveyance roller for conveying a print sheet toward the printing section might be carried out through the same transmission gear device in more detail from one drive motor from the form base loading a print sheet.

[0002]

[Description of the Prior Art] The form base 1 which loaded the print sheet P as conventionally shown in drawing 10 as this kind of feed equipment, The spring 3 which energizes the form base 1 so that said print sheet P may approach toward the feed roller 2, The cam 4 which moves the form base 1 in the direction which resists the energization force of this spring 3 and a print sheet P estranges from the feed roller 2, Conveyance roller pair 5a prepared in the direction downstream of a form feed from the feed roller 2, and 5b, It has the transmission gear device 7 in which the turning effort of a drive motor 6 is transmitted to said conveyance roller pair 5a, 5b, and said cam 4. Said form base 1 is moved in the direction in which a print sheet P approaches the feed roller 2 in an operation of said spring 3 by rotation of a cam 4, the print sheet P sent out with this feed roller 2 is supplied to conveyance roller pair 5a and 5b, and there are some which were constituted so that it might print in the printing section of the conveyance downstream.

[0003] And a pivot 8 is equipped with the 1st clutch gear 9 prepared so that it might rotate in one on said feed roller 2 and cam 4, and same axle, and it has the toothless gear section 10 on this clutch gear 9. Among the idle gear 11-20 in the transmission gear device 7 in which the turning effort from a drive motor 6 is transmitted, one idle gear 17 transmitted turning effort to one [ said ] conveyance roller 5b, and one idle gear 20 of another side have met the toothless gear section 10 in said clutch gear 9.

[0004] In the initial state (standby condition before paper is fed to a print sheet P), said cam 4 contacted the follower roller 21 in the form base 1, and has received force which is always rotated in the direction of arrow head R according to the upward energization force of a spring 3. On the other hand, the stop pawl 23 energized with the spring 22 stops to stop section 9a in the 1st clutch gear 9, and it is constituted so that rotation of the clutch gear 9 concerned may be made to suspend.

[0005] Moreover, the 2nd clutch gear 24 equipped with toothless gear section 24a is made to have met said idle gear 20. This clutch gear 24 is made to carry out push rotation of said stop pawl 23 in the direction of S. the cam section 25 for carrying out stop discharge of the stop pawl 23 from stop section 9a in said 1st clutch gear 9 is rotated in one -- as -- having -- this cam section 25 -- electromagnetism -- it is the configuration which engages and releases by the lever 27 rotated by actuation of a solenoid 26. Moreover, said 2nd clutch gear 24 is energized by the force of a spring 28 so that it may always rotate in the direction of Q.

[0006] In said initial state, the toothless gear section 10 in said idle gear 20 and said 1st clutch gear 9 and toothless gear section 24a in the 2nd clutch gear 24 are in the location which meets, respectively. If a drive motor 6 rotates in this condition, while that turning effort rotates conveyance roller 5b through the idler gears 11-17, similarly the idler gears 18-20 will be rotated, but as mentioned above, since the toothless section of the idler gear 20 and a clutch gear has met, both the clutch gears 9 and 24 are not rotated. next -- if the signal of form insertion enters -- electromagnetism -- current is supplied to a

solenoid 26, a lever 27 is attracted, and engagement in the cam section 25 is canceled.

[0007] Therefore, toothless gear section 24a of the 2nd clutch gear 24 by which rotation energization was carried out in the direction of Q with the spring 28 begins to gear with the idler gear 20, and carries out push rotation of the stop pawl 23 in the direction of S in the cam section 25. If it does so, since the 1st clutch gear 9 will be rotated in the direction of R with a cam 4 by the energization force of the spring 3 which carries out upward energization in said form base 1, the toothless gear section 10 gears shockingly to said idle gear 20, and a cam 4 and the feed roller 2 rotate one time by the engagement. Along with the rotation to the direction of R of said cam 4, the print sheet P in the form base 1 by which upward energization was carried out with said spring 3 is pushed against the inferior surface of tongue of the feed roller 2, and by rotation of the feed roller 2 concerned, a print sheet P is conveyed by conveyance roller pair 5a and 5b, and is conveyed to the printing section which is not illustrated. Rotating the stop pawl 23 in the anti-S directions by one rotation of said 2nd clutch gear 24, it engages with stop section 9a of the 1st clutch gear 9, and a cam 4 returns to the condition (initial state) of having pushed the form base 1 downward.

[0008]

[Problem(s) to be Solved by the Invention] If discharge of quiescence engagement of the 1st clutch gear 9 by the stop pawl 23 is performed and engagement with the toothless gear section 10 in the 1st clutch gear 9 concerned and said idle gear 20 is shockingly performed suddenly in the above-mentioned actuation Since the rotation energization force to the direction of R of the cam 4 with a spring 3 is strong, the turning effort to the direction of R of the 1st clutch gear 9 turns into motive power. Idle gear 20 will be rotated by the force beyond the turning effort by said drive motor 6. This turning effort is transmitted to conveyance roller 5b through other idle gear 19, 18, 16, and 17, the section rotated at a speed earlier than a predetermined bearer rate is generated, and rotation nonuniformity generates this conveyance roller 5b.

[0009] Therefore, when insertion of the following form was started during form conveyance by said conveyance roller pair 5a and 5b, the bearer rate of the print sheet by this conveyance roller pair 5a and 5b was confused, and the problem that turbulence arose was in the printing image in the printing section. This invention solves the above-mentioned problem and aims at offering feed equipment without turbulence of printing.

[0010]

[Means for Solving the Problem] In order to attain said purpose, feed equipment of this invention A form base loading a print sheet, and an energization means to energize a form base so that a print sheet on the form base may approach toward a feed roller, A cam which moves a form base in the direction which resists this energization force and a print sheet estranges from a feed roller, It has a conveyance roller pair prepared in the direction downstream of a form feed from a feed roller, and a transmission gear device in which turning effort of a drive motor is transmitted to a conveyance roller pair and said cam. In feed equipment which constitutes and becomes so that a print sheet which was made to move in the direction in which a print sheet approaches a feed roller in an operation of an energization means by rotation of a cam in a form base, and was sent out with a feed roller may be supplied to said conveyance roller pair A clutch object in which a toothless gear which is prepared pivotable on said cam and same axle, and meshes on one idler gear in said transmission gear device was formed, Said toothless portion is prepared between an idler gear, a stop means to suspend a clutch object in a location where it counters, and said cam and clutch object, to a cam, suitably, only an angle rotates freely and a clutch object establishes an engagement means by which both are engaged so that it may rotate in one with a cam after that.

[0011]

[Example] Next, if the example which materialized this invention is explained referring to a drawing, drawing 1 is the side elevation of the feed equipment shown in the state of the array of the same components as the conventional technology and abbreviation shown in drawing 10, will give the same sign to the same member as the conventional technology, and will omit detailed explanation. the pivotable support shaft 30 -- a end face -- the upper and lower sides -- upward energization of the tip side of the form base 1 supported rotatable is carried out with the energization means 31, such as a coil spring, and it constitutes so that the upper surface of the print sheet P loaded into said form base 1 may be made to approach in the direction of an inferior surface of tongue of the feed roller 2 which fixed to the pivot 8. While fixing the cam 4 made to meet the follower roller 21 formed so that a upward protrusion might be carried out at the 1 side of said form base 1, said pivot 8 is made to adjoin a pivot 8 with a cam 4 pivotable, and the clutch

object 32 is supported pivotably in it.

[0012] As shown in drawing 3 and drawing 4, the toothless gear 33 is formed in the clutch object 32 so that one idler gear 20 in said transmission gear device 7 may be met. And between a cam 4 and the clutch object 32, the clutch object 32 establishes an engagement means to engage only the central angle (rotation angle)  $\theta$  with both cam and clutch object 32 so that it may rotate freely and may rotate in one with a cam 4 after that suitably to a cam 4. the engagement projection object 34 which projects the axis and the letter of parallel of a pivot 8 from said cam 4 as the one example in the periphery section which adjoined the toothless gear 33 -- suitably -- the rotation angle  $\theta$  -- crossing -- rotation -- it is movable and the circle-like guide rail 35 is formed. The end slot 37 which separates said toothless partial 33a along the direction of an axis of a pivot 8 is formed so that root section 34a of said engagement projection object 34 may go under the toothless gear's 33 bore side dead air space 36, and this guide rail 35 can be passed, including the side of toothless partial 33a in said toothless gear 33 and said engagement projection object 34 can insert in a guide rail 35 from the toothless gear's 33 bore side dead air space 36.

[0013] Furthermore, the stop step 38 formed in the periphery of the clutch object 32 when a cam 4 was in the location of an initial state (refer to drawing 1), It passes into the possession of both with stop step 34a in said engagement projection object 34, it is constituted so that the tip of the stop pawl 23 energized with the spring 22 may engage and release, and the pin 40 by which the end of the spring 39 for carrying out rotation energization of the clutch object 32 in the direction of arrow head R of drawing 1 is engaged is protruded.

[0014] Next, actuation by these configurations is explained. If a drive motor 6 operates first, it will rotate in the direction of an arrow head of drawing 1, and conveyance roller pair 5a and 5b will rotate the idler gears 11-20 in the predetermined direction through the idler gear 17. The stop pawl 23 by which quiescence maintenance was carried out with the lever 27, and the clutch gear 24 and the cam section 25 rotatable in one were energized with the spring 22 in the initial state shown in drawing 1. Since it has stopped over stop step 34a in the stop step 38 of said clutch object 32, and the engagement projection object 34 of a cam 4, the clutch object 32 and a cam 4. Since it is stood still in the condition which shows as the continuous line of drawing 1 and drawing 6 and the toothless portion of toothless gear 24a in the clutch gear 24 and the toothless gear's 33 toothless portion in the clutch object 32 have met the idler gear 20, the turning effort of a drive motor 6 is not transmitted.

[0015] next -- if the signal of form insertion enters -- electromagnetism -- current is supplied to a solenoid 26, the lower limit side of a lever 27 is attracted, engagement in the cam section 25 is canceled, and, as for the clutch gear 24 by which rotation energization is carried out in the direction of Q by the force of a spring 28, the toothless gear section 24a gears with the idler gear 20. If it does so, since the cam section 25 will extrude said stop pawl 23 in the direction of arrow head S and the stop pawl 23 will separate from it from said both stop steps 34a and 38, the rotation of a cam 4 and the clutch object 32 to the direction of arrow head R is attained independently, respectively.

[0016] Since rotation energization is carried out in the direction of arrow head R with the follower roller 21 in the form base 1 on which the cam 4 was energized upward with the energization means 31 at this time. Immediately, a cam 4 rotates to the clockwise rotation of drawing 7 and drawing 8, upward moving of the form base 1 stops and rotation of a cam 4 is also stopped in the location (drawing 7) where the upper surface of the print sheet P on said form base 1 contacts the inferior surface of tongue of this cam 4 and the feed roller 2 rotated in one.

[0017] Namely, although the engagement projection object 34 in a cam 4 moves within the guide rail 35 in the clutch object 32 within limits with free rotation possible in which shown in drawing 6 as shown in drawing 8, push rotation of the clutch object 32 is not positively carried out in the direction of arrow head R with this engagement projection object 34. The clutch object 32 and a cam 4 concerned rotate in one, the clutch object 32 by which rotation energization is carried out rotating in the direction of arrow head R with a spring 39, the idler gear 20 and the toothless gear 33 meshing, and the rotational speed of the clutch object 32 being in a regularity (stationary) condition, and pushing the engagement projection object 34 on abbreviation coincidence in the direction of arrow head R by end 35a of the guide rail 35 of the clutch object 32 (refer to drawing 9).

[0018] One sheet of print sheet P pushed against this cam 4 and the feed roller 2 which rotates in one is taken up, is conveyed toward conveyance roller pair 5a and 5b, and is conveyed by the printing section. If a cam 4 pushes the follower roller 21 caudad and carries out downward rotation of the form base 1, while the

contact condition of the feed roller 2 and a print sheet P will be canceled, the clutch gear 24, the stop pawl 23, the clutch object 32, and a cam 4 return to the aforementioned initial state, and stop, respectively. [0019] Thus, from the physical relationship of the engagement projection object 34 and a guide rail 35, while a cam 4 and the clutch object 32 rotate one time Only a predetermined angle will form the free rotation field where the both concerned are not engaged, respectively. The energization force by the energization means 31 acts on the idler gear 20 shockingly, or The result which can prevent transmitting turning effort which accelerates the idler gear 20 concerned, Even if force which makes conveyance roller pair 5a and 5b generate rotation nonuniformity through this idler gear 20 does not act, therefore it puts [ be / it / under / print sheet P conveyance- / continuation ] in a form insertion command In the printing section, printing nonuniformity does not occur in a print sheet P, and a beautiful printing image can be obtained.

[0020] In addition, since the impact generated between a print sheet P and the feed roller 2 is absorbed when the print sheet P taken up is slippery with the surface of the print sheet P by the side of the inferior surface of tongue, or the form base 1 in case it pushes against the feed roller 2 turning around the print sheet P currently loaded into the form base 1 by the force of the energization means 31, the impact does not have a bad influence on the actuation within a feed device.

[0021] Moreover, in said example, it connected so that the feed roller 2 and a cam 4 might rotate in one, but you may equip so that the clutch object 32 and the feed roller 2 may rotate in one. Furthermore, if it constitutes so that the condition that the cam 4 and the clutch object 32 adjoined on the driving axle line can be held, a guide rail 35 may be formed in the 1 side of the clutch object 32, and although the guide rail 35 which formed the engagement projection object 34 in a cam 4 in the middle of the cylinder side of the clutch object 32 was made to attend in said example, you may constitute so that said engagement projection object 34 may be made to face this guide rail 35.

[0022] In addition, if not only a spring but the force is not too strong, giving an early turning effort to the clutch object 32 May be the force transmitted from a cam 4 side, establish the part which produces moderate frictional force between the clutch object 32 and a cam 4, or Material with moderate viscosity is put between the clutch object 32 and a cam 4, it constitutes or is made the configuration of connecting the clutch object 32 and a cam 4 with a weak spring so that it may corotate using the viscosity, and you may make it give an early turning effort to the clutch object 32.

[0023] In addition, since the back of the engagement projection object 34 and end 35a of a guide rail 35 have contacted in an initial state in said example while the stop pawl 23 is engaging with stop step 34a of a cam 4, Since the clutch object 32 does not have flexibility in rotation of the direction of R to a cam 4, even if the clutch object 32 omits the stop step 38, it has stopped through end 35a of a guide rail 35, and the engagement projection object 34. Moreover, it leaves the stop step 38, and the flexibility of the range which does not have trouble in actuation of said example is given, for example, you may make it set up so that it may have a crevice between the back of said engagement projection object 34, and end 35a of a guide rail 35.

[0024]

[Function and Effect of the Invention] An energization means to energize a form base so that the print sheet on the form base into which this invention loads a print sheet, and its form base may approach toward a feed roller, as explained above, The cam which moves a form base in the direction which resists this energization force and a print sheet estranges from a feed roller, It has the conveyance roller pair prepared in the direction downstream of a form feed from the feed roller, and the transmission gear device in which the turning effort of a drive motor is transmitted to a conveyance roller pair and said cam. In the feed equipment which constitutes and becomes so that the print sheet which was made to move in the direction in which a print sheet approaches a feed roller in an operation of an energization means by rotation of a cam in a form base, and was sent out with the feed roller may be supplied to said conveyance roller pair The clutch object in which the toothless gear which is prepared pivotable on said cam and same axle, and meshes on one idler gear in said transmission gear device was formed, A stop means to suspend a clutch object in the location where said toothless portion counters with an idler gear, It is prepared between said cams and clutch objects, and, only in an angle, a clutch object rotates freely suitably to a cam. An engagement means by which both are engaged is established so that it may rotate in one with a cam after that, and if a stop pawl separates from the cam which is depressing the form base downward, and a clutch object, said cam will rotate freely by the force of an energization means to press a form base



upward. On the other hand, the toothless gear meshes with idle gear, and the clutch object which had quiescence engagement canceled of said stop pawl begins to rotate in the hand of cut and this direction of said cam.

[0025] In this case, since a cam and a clutch object can rotate freely mutually in the fixed section and both are not restrained by said engagement means, the force of acting on a cam does not get across to a transmission gear device through a clutch object, as a result an idler gear, therefore only the turning effort from a drive-motor side acts to a conveyance roller pair, and the rotation nonuniformity of a conveyance roller pair does not occur with it.

[0026] And since a feed roller rotates one time so that it may rotate in [ a cam and clutch object ] one with said engagement means after the loss-of-teeth gear of an idler gear and clutch object meshing and rotating more than a fixed angle, and the print sheet on a form base may be conveyed toward a conveyance roller pair, and this after and clutch object stops with a stop means, it returns to the original quiescent state.

[0027] Since according to this invention the energization force of the energization means which pushes a form base in the direction of a feed roller acts only on a cam and does not act on a clutch object, for every feed actuation thus, according to said energization force The external force or impulse force which are rippled in a transmission gear device cannot act, but can lose the rotation nonuniformity of a conveyance roller pair, it is made not to generate turbulence of a printing image, and the effect that a good printing result can be obtained is done so.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is a side elevation in one example of this invention.

[Drawing 2] It is an outline plan.

[Drawing 3] It is a perspective diagram in the assembly condition of a cam and a clutch object.

[Drawing 4] some of cams and clutch objects -- it is a notch plan.

[Drawing 5] It is V-V line view drawing in drawing 4 .

[Drawing 6] It is operation explanatory drawing shown in the VI-VI line view cross section of drawing 3 .

[Drawing 7] It is the important section expansion side elevation showing the condition immediately after stop discharge of a stop pawl.

[Drawing 8] It is drawing showing phase relation with the guide rail of the engagement projection object of a cam, and a clutch object in the condition of drawing 7 .

[Drawing 9] It is the important section expansion side elevation showing the condition that a cam and a clutch object rotate in one.

[Drawing 10] It is the side elevation of the conventional technology.

[Description of Notations]

1 Form Base

2 Feed Roller

4 Cam

5a, 5b Conveyance roller pair

6 Drive Motor

7 Transmission Gear Device

21 Follower Roller

23 Stop Pawl

24 Clutch Gear

25 Cam Section

26 Electromagnetism -- Solenoid

27 Lever

31 Energization Means

32 Clutch Object

33 Toothless Gear

34 Engagement Projection Object

35 Guide Rail

34a, 38 Stop step

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[Translation done.]

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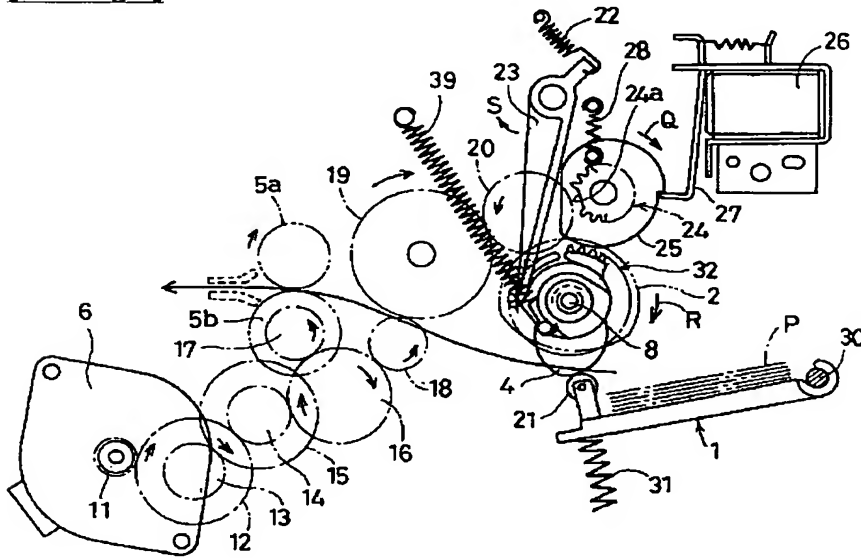
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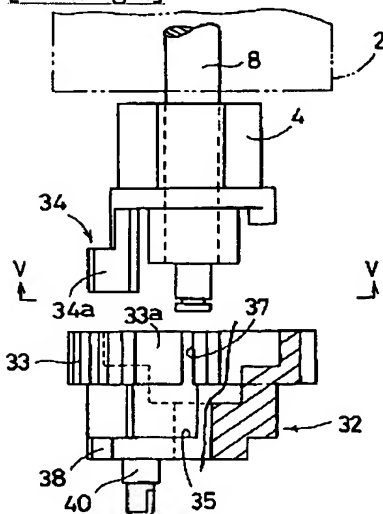
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## DRAWINGS

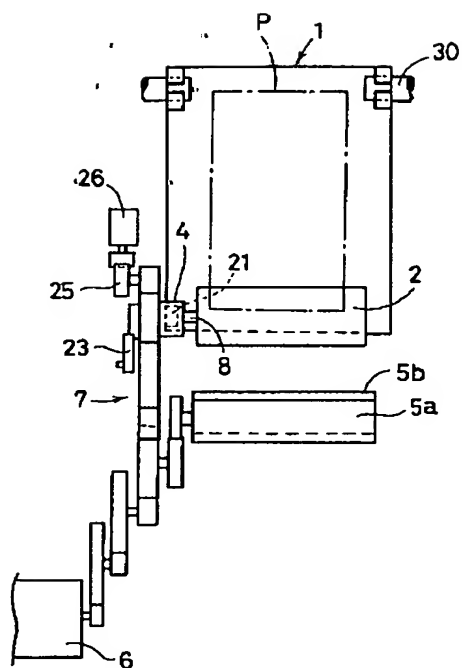
[Drawing 1]



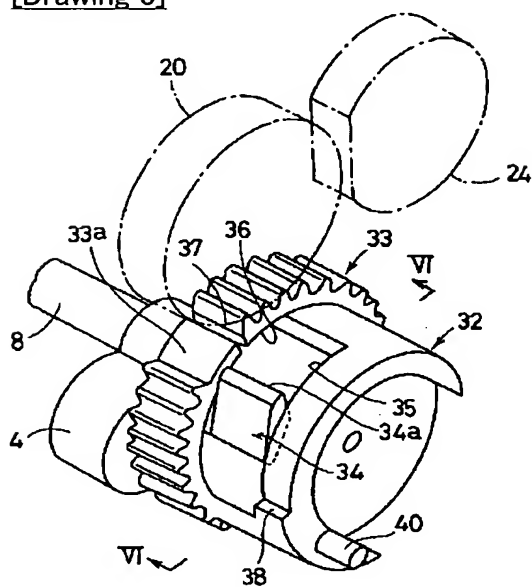
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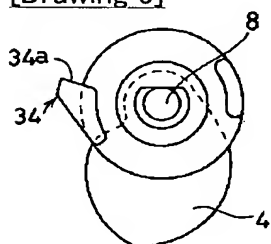
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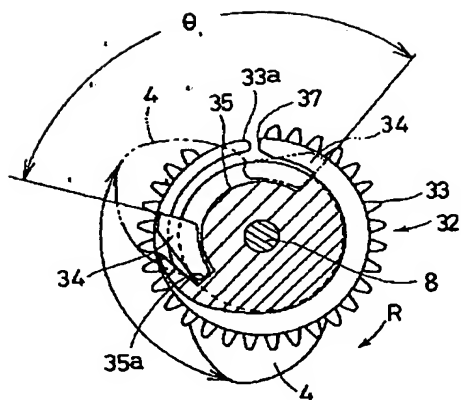
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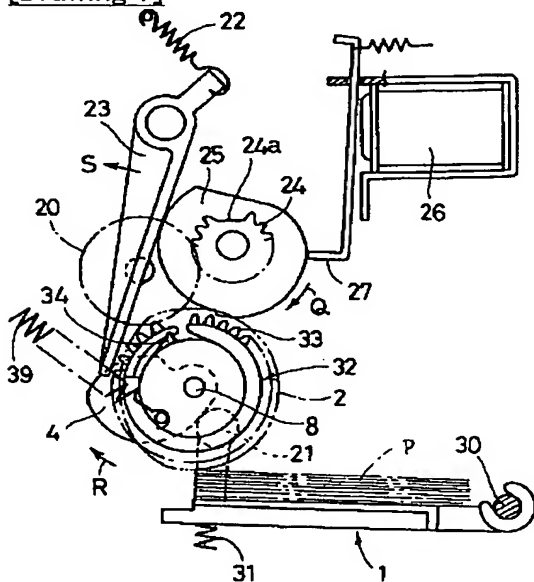
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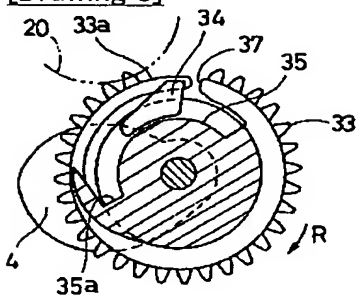
[Drawing 6]



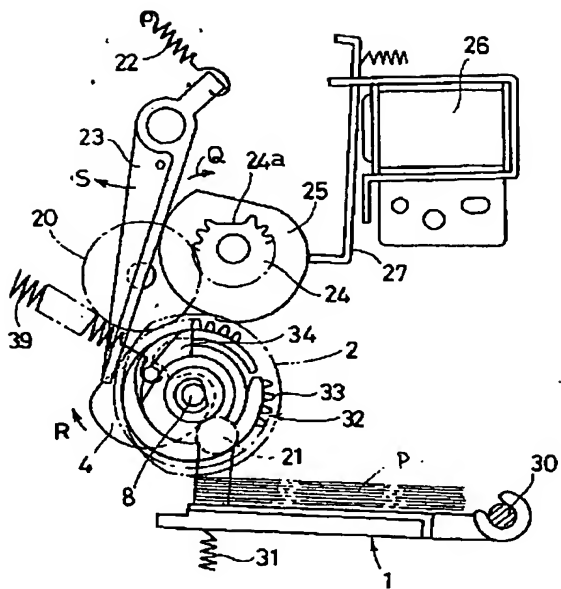
[Drawing 7]



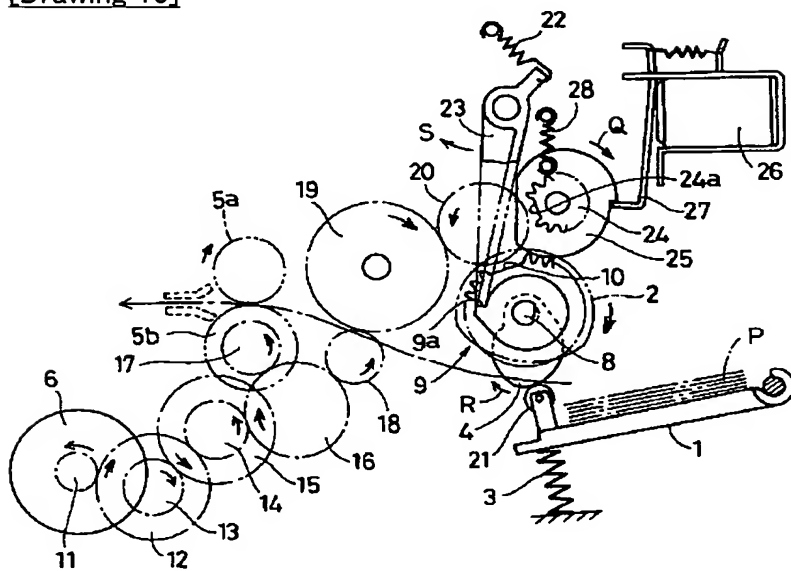
[Drawing 8]



[Drawing 9]



[Drawing 10]



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## CORRECTION OR AMENDMENT

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[Procedure amendment 1]

[Document to be Amended] Specification

[Item(s) to be Amended] Whole sentence

[Method of Amendment] Modification

[Proposed Amendment]

[Document Name] Specification

[Title of the Invention] Feed equipment

[Claim(s)]

[Claim 1] A form base loading a print sheet, and an energization means to energize a form base so that a print sheet on the form base may approach toward a feed roller, A cam which moves a form base in the direction which resists this energization force and a print sheet estranges from a feed roller, It has a conveyance roller formed in the direction downstream of a form feed from a feed roller, and a transmission gear device which consists of at least one idler gear which transmits turning effort of a drive motor to a conveyance roller and said cam. In feed equipment which constitutes and becomes so that a print sheet which was made to move in the direction in which a print sheet approaches a feed roller in an operation of an energization means by rotation of a cam in a form base, and was sent out with a feed roller may be supplied to said conveyance roller A clutch object in which a toothless gear which meshes on an idler gear in said transmission gear device was formed, Feed equipment with which said toothless portion is characterized by establishing an engagement means by which only an angle is suitably engaged possible [ free rotation ] in an idler gear, a stop means to suspend a clutch object in a location where it counters, and said cam and clutch object.

## [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the feed equipment in a printer etc., and relates to the structure of the feed equipment constituted so that the power transfer of the device which separates and supplies one sheet of print sheet at a time, and the form conveyance roller for conveying a print sheet toward the printing section might be carried out through the same transmission gear device in more detail from one drive motor from the form base loading a print sheet.

[0002]

[Description of the Prior Art] The form base 1 which loaded the print sheet P as conventionally shown in drawing 10 as this kind of feed equipment, The spring 3 which energizes the form base 1 so that said print sheet P may approach toward the feed roller 2, The cam 4 which moves the form base 1 in the direction which resists the energization force of this spring 3 and a print sheet P estranges from the feed roller 2, Conveyance roller pair 5a prepared in the direction downstream of a form feed from the feed roller 2, and 5b, It has the transmission gear device 7 in which the turning effort of a drive motor 6 is transmitted to said conveyance roller pair 5a, 5b, and said cam 4. Said form base 1 is moved in the direction in which a print sheet P approaches the feed roller 2 in an operation of said spring 3 by rotation of a cam 4, the print sheet P sent out with this feed roller 2 is supplied to conveyance roller pair 5a and 5b, and there are some which were constituted so that it might print in the printing section of the conveyance downstream.

[0003] And a pivot 8 is equipped with the 1st clutch gear 9 prepared so that it might rotate in one on said feed roller 2 and cam 4, and same axle, and it has the toothless gear section 10 on this clutch gear 9.

Among the idle gear 11-20 in the transmission gear device 7 in which the turning effort from a drive motor 6 is transmitted, one idle gear 17 transmitted turning effort to one [ said ] conveyance roller 5b, and one idle gear 20 of another side have met the toothless gear section 10 in said clutch gear 9.

[0004] In the initial state (standby condition before paper is fed to a print sheet P), said cam 4 contacted the follower roller 21 in the form base 1, and has received force which is always rotated in the direction of arrow head R according to the upward energization force of a spring 3. On the other hand, the stop pawl 23 energized with the spring 22 stops to stop section 9a in the 1st clutch gear 9, and it is constituted so that rotation of the clutch gear 9 concerned may be made to suspend.

[0005] Moreover, the 2nd clutch gear 24 equipped with toothless gear section 24a is made to have met said idle gear 20. This clutch gear 24 is made to carry out push rotation of said stop pawl 23 in the direction of S. the cam section 25 for carrying out stop discharge of the stop pawl 23 from stop section 9a in said 1st clutch gear 9 is rotated in one -- as -- having -- this cam section 25 -- electromagnetism -- it is the configuration which engages and releases by the lever 27 rotated by actuation of a solenoid 26. Moreover, said 2nd clutch gear 24 is energized by the force of a spring 28 so that it may always rotate in the direction of Q.

[0006] In said initial state, the toothless gear section 10 in said idle gear 20 and said 1st clutch gear 9 and toothless gear section 24a in the 2nd clutch gear 24 are in the location which meets, respectively. If a drive motor 6 rotates in this condition, while that turning effort rotates conveyance roller 5b through the idler gears 11-17, similarly the idler gears 18-20 will be rotated, but as mentioned above, since the toothless section of the idler gear 20 and a clutch gear has met, both the clutch gears 9 and 24 are not rotated. next -- if the signal of form insertion enters -- electromagnetism -- current is supplied to a solenoid 26, a lever 27 is attracted, and engagement in the cam section 25 is canceled.

[0007] Therefore, toothless gear section 24a of the 2nd clutch gear 24 by which rotation energization was carried out in the direction of Q with the spring 28 begins to gear with the idler gear 20, and carries out push rotation of the stop pawl 23 in the direction of S in the cam section 25. If it does so, since the 1st clutch gear 9 will be rotated in the direction of R with a cam 4 by the energization force of the spring 3 which carries out upward energization in said form base 1, the toothless gear section 10 gears shockingly to said idle gear 20, and a cam 4 and the feed roller 2 rotate one time by the engagement. Along with the rotation to the direction of R of said cam 4, the print sheet P in the form base 1 by which upward energization was carried out with said spring 3 is pushed against the inferior surface of tongue of the feed roller 2, and by rotation of the feed roller 2 concerned, a print sheet P is conveyed by conveyance roller pair 5a and 5b, and is conveyed to the printing section which is not illustrated. Rotating the stop pawl 23 in the anti-S directions by one rotation of said 2nd clutch gear 24, it engages with stop section 9a of the 1st clutch gear 9, and a cam 4 returns to the condition (initial state) of having pushed the form base 1



downward.

[0008]

[Problem(s) to be Solved by the Invention] If discharge of quiescence engagement of the 1st clutch gear 9 by the stop pawl 23 is performed and engagement with the toothless gear section 10 in the 1st clutch gear 9 concerned and said idle gear 20 is shockingly performed suddenly in the above-mentioned actuation Since the rotation energization force to the direction of R of the cam 4 with a spring 3 is strong, the turning effort to the direction of R of the 1st clutch gear 9 turns into motive power. Idle gear 20 will be rotated by the force beyond the turning effort by said drive motor 6. This turning effort is transmitted to conveyance roller 5b through other idle gear 19, 18, 16, and 17, the section rotated at a speed earlier than a predetermined bearer rate is generated, and rotation nonuniformity generates this conveyance roller 5b.

[0009] Therefore, when insertion of the following form was started during form conveyance by said conveyance roller pair 5a and 5b, the bearer rate of the print sheet by this conveyance roller pair 5a and 5b was confused, and the problem that turbulence arose was in the printing image in the printing section.

[0010] This invention solves the above-mentioned problem and aims at offering feed equipment without turbulence of printing.

[0011]

[Means for Solving the Problem] In order to attain said purpose, feed equipment of this invention A form base loading a print sheet, and an energization means to energize a form base so that a print sheet on the form base may approach toward a feed roller, A cam which moves a form base in the direction which resists this energization force and a print sheet estranges from a feed roller, It has a conveyance roller pair prepared in the direction downstream of a form feed from a feed roller, and a transmission gear device which consists of at least one eye DORAKIYA which transmits turning effort of a drive motor to a conveyance roller and said cam. In feed equipment which constitutes and becomes so that a print sheet which was made to move in the direction in which a print sheet approaches a feed roller in an operation of an energization means by rotation of a cam in a form base, and was sent out with a feed roller may be supplied to said conveyance roller A clutch object in which a toothless gear which meshes on an idler gear in said transmission gear device was formed, and said toothless portion establish an engagement means by which an idler gear, a stop means to suspend a clutch object in a location where it counters, and said cam and clutch object are engaged that only an angle can be rotated freely suitably.

[0012]

[Example] Next, if the example which materialized this invention is explained referring to a drawing, drawing 1 is the side elevation of the feed equipment shown in the state of the array of the same components as the conventional technology and abbreviation shown in drawing 10, will give the same sign to the same member as the conventional technology, and will omit detailed explanation.

[0013] the pivotable support shaft 30 -- a end face -- the upper and lower sides -- upward energization of the tip side of the form base 1 supported rotatable is carried out with the energization means 31, such as a coil spring, and it constitutes so that the upper surface of the print sheet P loaded into said form base 1 may be made to approach in the direction of an inferior surface of tongue of the feed roller 2 which fixed to the pivot 8. While fixing the cam 4 made to meet the follower roller 21 formed so that a upward protrusion might be carried out at the 1 side of said form base 1 to a pivot 8, said pivot 8 is made to adjoin a pivot 8 with a cam 4 pivotable, and the clutch object 32 is supported pivotably in it.

[0014] As shown in drawing 3 and drawing 4, the toothless gear 33 is formed in the clutch object 32 so that one idler gear 20 in said transmission gear device 7 may be met. And between a cam 4 and the clutch object 32, the clutch object 32 establishes an engagement means to engage only the central angle (rotation angle) theta with both cam and clutch object 32 so that it may rotate freely and may rotate in one with a cam 4 after that suitably to a cam 4. the engagement projection object 34 which projects the axis and the letter of parallel of a pivot 8 from said cam 4 as the one example in the periphery section which adjoined the toothless gear 33 -- suitably -- the rotation angle theta -- crossing -- rotation -- it is movable and the circle-like guide rail 35 is formed. The end slot 37 which separates said toothless partial 33a along the direction of an axis of a pivot 8 is formed so that root section 34a of said engagement projection object 34 may go under the toothless gear's 33 bore side dead air space 36, and this guide rail 35 can be passed, including the side of toothless partial 33a in said toothless gear 33 and said engagement projection object 34 can insert in a guide rail 35 from the toothless gear's 33 bore side dead air space 36.

[0015] Furthermore, the stop step 38 formed in the periphery of the clutch object 32 when a cam 4 was in

the location of an initial state (refer to drawing 1), It passes into the possession of both with stop step 34a in said engagement projection object 34, it is constituted so that the tip of the stop pawl 23 energized with the spring 22 may engage and release, and the pin 40 by which the end of the spring 39 for carrying out rotation energization of the clutch object 32 in the direction of arrow head R of drawing 1 is engaged is protruded.

[0016] Next, actuation by these configurations is explained. If a drive motor 6 operates first, it will rotate in the direction of an arrow head of drawing 1, and conveyance roller pair 5a and 5b will rotate the idler gears 11-20 in the predetermined direction through the idler gear 17. The stop pawl 23 by which quiescence maintenance was carried out with the lever 27, and the clutch gear 24 and the cam section 25 rotatable in one were energized with the spring 22 in the initial state shown in drawing 1. Since it has stopped over stop step 34a in the stop step 38 of said clutch object 32, and the engagement projection object 34 of a cam 4, the clutch object 32 and a cam 4. Since it is stood still in the condition which shows as the continuous line of drawing 1 and drawing 6 and the toothless portion of toothless gear 24a in the clutch gear 24 and the toothless gear's 33 toothless portion in the clutch object 32 have met the idler gear 20, the turning effort of a drive motor 6 is not transmitted.

[0017] next -- if the signal of form insertion enters -- electromagnetism -- current is supplied to a solenoid 26, the lower limit side of a lever 27 is attracted, engagement in the cam section 25 is canceled, and, as for the clutch gear 24 by which rotation energization is carried out in the direction of Q by the force of a spring 28, the toothless gear section 24a gears with the idler gear 20. If it does so, since the cam section 25 will extrude said stop pawl 23 in the direction of arrow head S and the stop pawl 23 will separate from it from said both stop steps 34a and 38, the rotation of a cam 4 and the clutch object 32 to the direction of arrow head R is attained independently, respectively.

[0018] Since rotation energization is carried out in the direction of arrow head R with the follower roller 21 in the form base 1 on which the cam 4 was energized upward with the energization means 31 at this time. Immediately, a cam 4 rotates to the clockwise rotation of drawing 7 and drawing 8, upward moving of the form base 1 stops and rotation of a cam 4 is also stopped in the location (drawing 7) where the upper surface of the print sheet P on said form base 1 contacts the inferior surface of tongue of this cam 4 and the feed roller 2 rotated in one.

[0019] Namely, although the engagement projection object 34 in a cam 4 moves within the guide rail 35 in the clutch object 32 within limits with free rotation possible in which shown in drawing 6 as shown in drawing 8, push rotation of the clutch object 32 is not positively carried out in the direction of arrow head R with this engagement projection object 34. The clutch object 32 and a cam 4 concerned rotate in one, the clutch object 32 by which rotation energization is carried out rotating in the direction of arrow head R with a spring 39, the idler gear 20 and the toothless gear 33 meshing, and the rotational speed of the clutch object 32 being in a regularity (stationary) condition, and pushing the engagement projection object 34 on abbreviation coincidence in the direction of arrow head R by end 35a of the guide rail 35 of the clutch object 32 (refer to drawing 9).

[0020] One sheet of print sheet P pushed against this cam 4 and the feed roller 2 which rotates in one is taken up, is conveyed toward conveyance roller pair 5a and 5b, and is conveyed by the printing section. If a cam 4 pushes the follower roller 21 caudad and carries out downward rotation of the form base 1, while the contact condition of the feed roller 2 and a print sheet P will be canceled, the clutch gear 24, the stop pawl 23, the clutch object 32, and a cam 4 return to the aforementioned initial state, and stop, respectively.

[0021] Thus, from the physical relationship of the engagement projection object 34 and a guide rail 35, while a cam 4 and the clutch object 32 rotate one time. Only a predetermined angle will form the free rotation field where the both concerned are not engaged, respectively. The energization force by the energization means 31 acts on the idler gear 20 shockingly, or The result which can prevent transmitting turning effort which accelerates the idler gear 20 concerned, Even if force which makes conveyance roller pair 5a and 5b generate rotation nonuniformity through this idler gear 20 does not act, therefore it puts [ be / it / under / print sheet P conveyance- / continuation ] in a form insertion command. In the printing section, printing nonuniformity does not occur in a print sheet P, and a beautiful printing image can be obtained.

[0022] In addition, since the impact generated between a print sheet P and the feed roller 2 is absorbed when the print sheet P taken up is slippery with the surface of the print sheet P by the side of the inferior surface of tongue, or the form base 1 in case it pushes against the feed roller 2 turning around the print

sheet P currently loaded into the form base 1 by the force of the energization means 31, the impact does not have a bad influence on the actuation within a feed device.

[0023] Moreover, in said example, it connected so that the feed roller 2 and a cam 4 might rotate in one, but you may equip so that the clutch object 32 and the feed roller 2 may rotate in one. Furthermore, if it constitutes so that the condition that the cam 4 and the clutch object 32 adjoined on the driving axle line can be held; a guide rail 35 may be formed in the 1 side of the clutch object 32, and although the guide rail 35 which formed the engagement projection object 34 in a cam 4 in the middle of the cylinder side of the clutch object 32 was made to attend in said example, you may constitute so that said engagement projection object 34 may be made to face this guide rail 35.

[0024] In addition, if not only a spring but the force is not too strong, giving an early turning effort to the clutch object 32 May be the force transmitted from a cam 4 side, establish the part which produces moderate frictional force between the clutch object 32 and a cam 4, or Material with moderate viscosity is put between the clutch object 32 and a cam 4, it constitutes or is made the configuration of connecting the clutch object 32 and a cam 4 with a weak spring so that it may corotate using the viscosity, and you may make it give an early turning effort to the clutch object 32. In addition, since the back of the engagement projection object 34 and end 35a of a guide rail 35 have contacted in an initial state in said example while the stop pawl 23 is engaging with stop step 34a of a cam 4, Since the clutch object 32 does not have flexibility in rotation of the direction of R to a cam 4, even if the clutch object 32 omits the stop step 38, it has stopped through end 35a of a guide rail 35, and the engagement projection object 34. Moreover, it leaves the stop step 38, and the flexibility of the range which does not have trouble in actuation of said example is given, for example, you may make it set up so that it may have a crevice between the back of said engagement projection object 34, and end 35a of a guide rail 35.

[0025]

[Function and Effect of the Invention] An energization means to energize a form base so that the print sheet on the form base into which this invention loads a print sheet, and its form base may approach toward a feed roller, as explained above, The cam which moves a form base in the direction which resists this energization force and a print sheet estranges from a feed roller, It has the conveyance roller pair prepared in the direction downstream of a form feed from the feed roller, and the transmission gear device which consists of at least one idler gear which transmits the turning effort of a drive motor to a conveyance roller and said cam. In the feed equipment which constitutes and becomes so that the print sheet which was made to move in the direction in which a print sheet approaches a feed roller in an operation of an energization means by rotation of a cam in a form base, and was sent out with the feed roller may be supplied to said conveyance roller The clutch object in which the toothless gear which meshes on the idler gear in said transmission gear device was formed, A stop means to suspend a clutch object in the location where said toothless portion counters with an idler gear, An engagement means by which said cam and clutch object are engaged that only an angle can be rotated freely suitably is established, and if a stop pawl separates from the cam which is depressing the form base downward, and a clutch object, said cam will rotate freely by the force of an energization means to press a form base upward. On the other hand, the toothless gear meshes with idle gear, and the clutch object which had quiescence engagement canceled of said stop pawl begins to rotate in the hand of cut and this direction of said cam.

[0026] In this case, since a cam and a clutch object can rotate freely mutually in the fixed section and both are not restrained by said engagement means, the force of acting on a cam does not get across to a transmission gear device through a clutch object, as a result an idler gear, therefore only the turning effort from a drive-motor side acts to a conveyance roller pair, and the rotation nonuniformity of a conveyance roller pair does not occur with it.

[0027] And since a feed roller rotates one time so that it may rotate in [ a cam and clutch object ] one with said engagement means after the loss-of-teeth gear of an idler gear and clutch object meshing and rotating more than a fixed angle, and the print sheet on a form base may be conveyed toward a conveyance roller pair, and this after and clutch object stops with a stop means, it returns to the original quiescent state.

[0028] Since according to this invention the energization force of the energization means which pushes a form base in the direction of a feed roller acts only on a cam and does not act on a clutch object, for every feed actuation thus, according to said energization force The external force or impulse force which are

rippled in a transmission gear device cannot act, but can lose the rotation nonuniformity of a conveyance roller pair, it is made not to generate turbulence of a printing image, and the effect that a good printing result can be obtained is done so.

[Brief Description of the Drawings]

[Drawing 1] It is a side elevation in one example of this invention.

[Drawing 2] It is an outline plan.

[Drawing 3] It is a perspective diagram in the assembly condition of a cam and a clutch object.

[Drawing 4] some of cams and clutch objects — it is a notch plan.

[Drawing 5] It is V-V line view drawing in drawing 4.

[Drawing 6] It is operation explanatory drawing shown in the VI-VI line view cross section of drawing 3.

[Drawing 7] It is the important section expansion side elevation showing the condition immediately after stop discharge of a stop pawl.

[Drawing 8] It is drawing showing phase relation with the guide rail of the engagement projection object of a cam, and a clutch object in the condition of drawing 7.

[Drawing 9] It is the important section expansion side elevation showing the condition that a cam and a clutch object rotate in one.

[Drawing 10] It is the side elevation of the conventional technology.

[Description of Notations]

1 Form Base

2 Feed Roller

4 Cam

5a, 5b Conveyance roller pair

6 Drive Motor

7 Transmission Gear Device

21 Follower Roller

23 Stop Pawl

24 Clutch Gear

25 Cam Section

26 Electromagnetism — Solenoid

27 Lever

31 Energization Means

32 Clutch Object

33 Toothless Gear

34 Engagement Projection Object

35 Guide Rail

34a, 38 Stop step

[Procedure amendment 2]

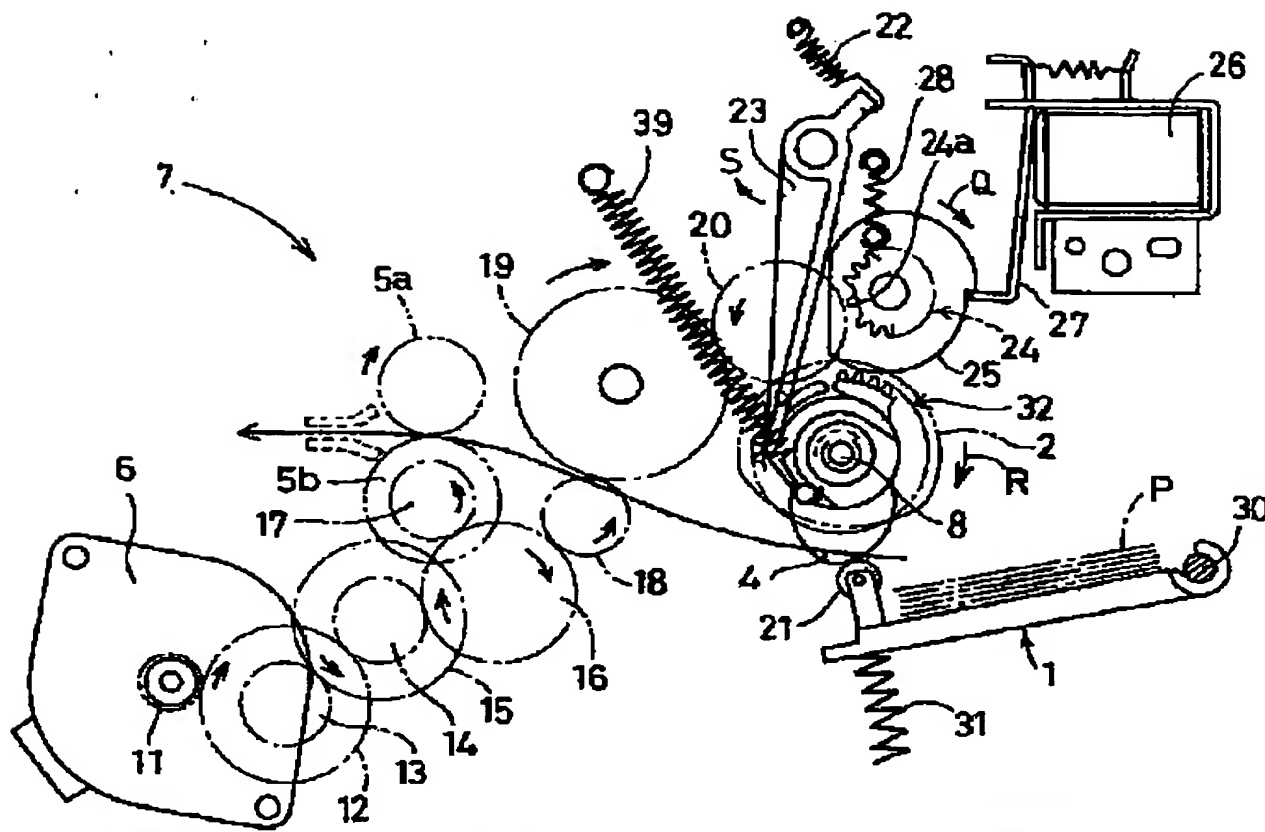
[Document to be Amended] DRAWINGS

[Item(s) to be Amended] drawing 1

[Method of Amendment] Modification

[Proposed Amendment]

[Drawing 1]



[Procedure amendment 3]

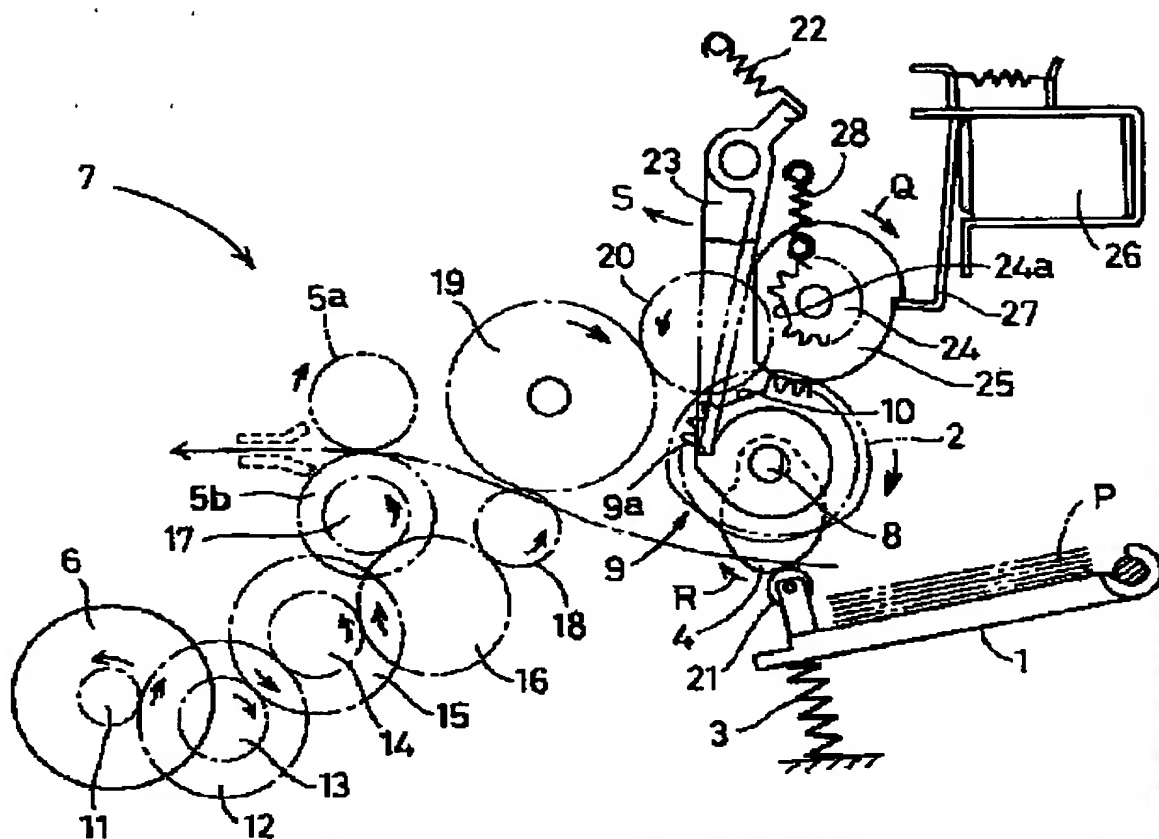
[Document to be Amended] DRAWINGS

[Item(s) to be Amended] drawing 10

[Method of Amendment] Modification

[Proposed Amendment]

[Drawing 10]



[Translation done.]

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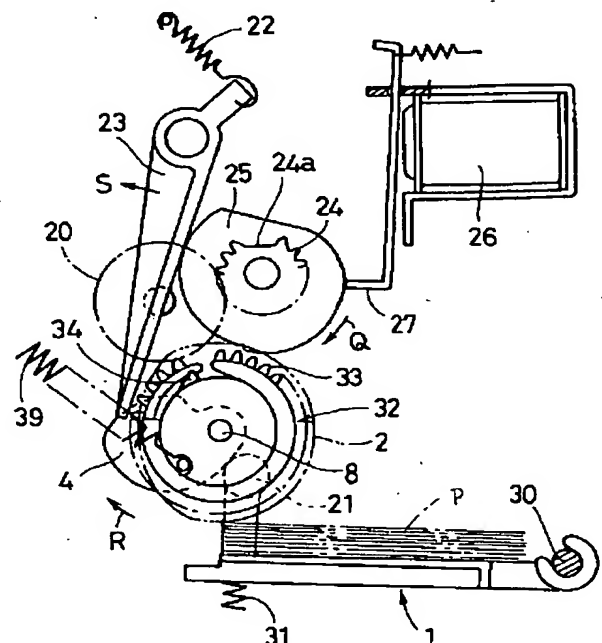
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(54)【発明の名称】 給紙装置

(57)【要約】

【目的】給紙装置における用紙台を押し上げている付勢手段の力による衝撃力や回転ムラを、伝動ギヤ機構内に伝達させないようにして、印刷画像に悪影響を与えないようする。

【構成】伝動ギヤ機構における1つのアイドルギヤ20に噛み合う欠歯歯車33を形成したクラッチ体32と、用紙台1を上向きに押圧する付勢手段31の力に抗して下押しするカム4とを支軸8にそれぞれ回転可能に設け、係止爪23にてカム4とクラッチ体32とを静止係止する。係止爪23がカム4及びクラッチ体32から外れると、付勢手段31によりカム4が単独で自由回転し、略同時にクラッチ体32の欠歯歯車33がアイドルギヤ20に噛み合って定常回転すると、カム4における係合突起体34を介して当該カム4とクラッチ体32とが一体的に1回転する。





1

## 【特許請求の範囲】

【請求項1】 印刷用紙を積載する用紙台と、その用紙台上の印刷用紙が給紙ローラに向かって接近するように用紙台を付勢する付勢手段と、この付勢力に抗し印刷用紙が給紙ローラから離間する方向に用紙台を移動させるカムと、給紙ローラから用紙送り方向下流側に設けられた搬送ローラ対と、駆動モータの回転力を搬送ローラ対及び前記カムに伝達する伝動ギヤ機構とを備え、カムの回転により用紙台を付勢手段の作用で印刷用紙が給紙ローラに接近する方向に移動させ、給紙ローラにより送り出された印刷用紙を前記搬送ローラ対に供給するように構成してなる給紙装置において、前記カムと同軸上に回転可能に設けられ、且つ前記伝動ギヤ機構における1つのアイドルギヤに噛み合う欠歯歯車を形成したクラッチ体と、前記欠歯部分がアイドルギヤと対向する位置でクラッチ体を停止する係止手段と、前記カムとクラッチ体との間に設けられ、カムに対してクラッチ体が適宜角度だけ自由回転し、その後カムと一体的に回転するように両者を係合する係合手段を設けたことを特徴とする給紙装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、プリンタ等における給紙装置に係り、より詳しくは、印刷用紙を積載した用紙台から1枚づつ印刷用紙を分離して供給する機構と、印刷部に向かって印刷用紙を搬送するための用紙搬送ローラとが、1つの駆動モータから同じ伝動ギヤ機構を介して動力伝達されるように構成した給紙装置の構造に関するものである。

## 【0002】

【従来の技術】 従来、この種の給紙装置として、図10に示すように、印刷用紙Pを積載した用紙台1と、前記印刷用紙Pが給紙ローラ2に向かって接近するように用紙台1を付勢するばね3と、このばね3の付勢力に抗して印刷用紙Pが給紙ローラ2から離間する方向に用紙台1を移動させるカム4と、給紙ローラ2から用紙送り方向下流側に設けられた搬送ローラ対5a、5bと、駆動モータ6の回転力を前記搬送ローラ対5a、5b及び前記カム4に伝達する伝動ギヤ機構7とを備え、カム4の回転により前記用紙台1を前記ばね3の作用で印刷用紙Pが給紙ローラ2に接近する方向に移動させ、該給紙ローラ2により送り出された印刷用紙Pを搬送ローラ対5a、5bに供給し、その搬送下流側の印刷部にて印刷するように構成したものがある。

【0003】 そして、支軸8には、前記給紙ローラ2及びカム4と同軸上に一体的に回転するように設けられた第1のクラッチギヤ9を備え、該クラッチギヤ9には、欠歯ギヤ部10を有する。駆動モータ6からの回転力を伝達する伝動ギヤ機構7におけるアイドルギヤ11～20のうち1つのアイドルギヤ17は前記一方の搬送

2

ローラ5bに回転力を伝達し、他方の1つのアイドルギヤ20は前記クラッチギヤ9における欠歯ギヤ部10と対面している。

【0004】 初期状態（印刷用紙Pが給紙される前の待機状態）において、前記カム4は、用紙台1における従節ローラ21に当接し、ばね3の上向き付勢力により、常時矢印R方向に回転されるような力を受けている。一方、ばね22にて付勢された係止爪23は第1のクラッチギヤ9における係止部9aに係止し、当該クラッチギヤ9の回転を一旦停止させるように構成している。

【0005】 また、欠歯歯車部24aを備えた第2のクラッチギヤ24は前記アイドルギヤ20と対面させてあり、該クラッチギヤ24には前記係止爪23をS方向に押し回動させて、係止爪23を前記第1のクラッチギヤ9における係止部9aから係止解除させるためのカム部25を一体的に回転するように備え、このカム部25は電磁ソレノイド26の作動にて回動するレバー27により係脱する構成である。また、前記第2クラッチギヤ24はばね28の力により、常時Q方向に回転するように付勢されている。

【0006】 前記初期状態において、前記アイドルギヤ20と、前記第1のクラッチギヤ9における欠歯ギヤ部10と第2のクラッチギヤ24における欠歯歯車部24aとがそれぞれ対面する位置にある。この状態で、駆動モータ6が回転すると、その回転力はアイドルギヤ11～17を介して搬送ローラ5bを回転させる一方、同じくアイドルギヤ18～20を回転させるが、前述のように、アイドルギヤ20とクラッチギヤの欠歯部とが対面しているので、両クラッチギヤ9、24は回転しない。次に、用紙挿入の信号が入ると、電磁ソレノイド26に電流が供給され、レバー27を吸引してカム部25との係合が解除される。

【0007】 従って、ばね28によりQ方向に回転付勢された第2クラッチギヤ24の欠歯歯車部24aがアイドルギヤ20と噛み合い始め、カム部25にて係止爪23をS方向に押し回動する。そうすると、前記用紙台1の上向き付勢するばね3の付勢力にてカム4と共に第1のクラッチギヤ9をR方向に回動させるから、その欠歯ギヤ部10が前記アイドルギヤ20に衝撃的に噛み合い、その噛み合いにて、カム4及び給紙ローラ2が1回転する。前記カム4のR方向への回動につれて、前記ばね3にて上向き付勢された用紙台1における印刷用紙Pは給紙ローラ2の下面に押しつけられ、当該給紙ローラ2の回転にて印刷用紙Pは搬送ローラ対5a、5bに搬送され、図示しない印刷部へと搬送される。前記第2のクラッチギヤ24の1回転にて係止爪23は反S方向へ回動し、第1クラッチギヤ9の係止部9aに係合してカム4は用紙台1を下向きに押した状態（初期状態）に復帰する。

## 【0008】

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【発明が解決しようとする課題】前述の作動において、係止爪23による第1のクラッチギヤ9の静止係合の解除が実行されて、当該第1のクラッチギヤ9における欠歯ギヤ部10と前記アイドルギヤ20との噛み合いが衝撃的に突然実行されると、ばね3によるカム4のR方向への回転付勢力が強いため、第1のクラッチギヤ9のR方向への回転力が原動力となって、アイドルギヤ20を前記駆動モータ6による回転力以上の力にて回転することになり、この回転力が他のアイドルギヤ19, 18, 16, 17を介して搬送ローラ5bに伝達され、該搬送ローラ5bは所定の搬送速度より早い速度で回転する区間が生じ、回転ムラが発生する。

【0009】そのため、前記搬送ローラ対5a, 5bによる用紙搬送中に、次の用紙の挿入を開始すると、この搬送ローラ対5a, 5bによる印刷用紙の搬送速度が乱れて、印刷部での印刷画像に乱れが生じるという問題があった。本発明は、上記の問題を解決し、印刷の乱れない給紙装置を提供することを目的とするものである。

【0010】

【課題を解決するための手段】前記目的を達成するため、本発明の給紙装置は、印刷用紙を積載する用紙台と、その用紙台上の印刷用紙が給紙ローラに向かって接近するように用紙台を付勢する付勢手段と、この付勢力に抗し印刷用紙が給紙ローラから離間する方向に用紙台を移動させるカムと、給紙ローラから用紙送り方向下流側に設けられた搬送ローラ対と、駆動モータの回転力を搬送ローラ対及び前記カムに伝達する伝動ギヤ機構とを備え、カムの回転により用紙台を付勢手段の作用で印刷用紙が給紙ローラに接近する方向に移動させ、給紙ローラにより送り出された印刷用紙を前記搬送ローラ対に供給するように構成してなる給紙装置において、前記カムと同軸上に回転可能に設けられ、且つ前記伝動ギヤ機構における1つのアイドルギヤに噛み合う欠歯歯車を形成したクラッチ体と、前記欠歯部分がアイドルギヤと対向する位置でクラッチ体を停止する係止手段と、前記カムとクラッチ体との間に設けられ、カムに対してクラッチ体が適宜角度だけ自由回転し、その後カムと一体的に回転するように両者を係合する係合手段を設けたものである。

【0011】

【実施例】次に本発明を具体化した実施例を図面を参照しながら説明すると、図1は、図10に示す従来技術と略同様の部品の配列状態で示す給紙装置の側面図であって、従来技術と同一の部材には同一の符号を付して詳細な説明を省略する。枢支軸30にて基端を上下回動可能に支持された用紙台1の先端側をコイルバネ等の付勢手段31にて上向き付勢し、支軸8に固着した給紙ローラ2の下面方向に、前記用紙台1に積載された印刷用紙Pの上面を接近させるように構成する。前記支軸8には、前記用紙台1の一侧に上向き突出するように設けた従節

ローラ21と対面させるカム4を固着する一方、クラッチ体32を支軸8に回転可能に且つカム4と隣接させて枢支する。

【0012】図3及び図4に示すように、クラッチ体32には、前記伝動ギヤ機構7における1つのアイドルギヤ20と対面するように、欠歯歯車33を設ける。そして、カム4とクラッチ体32との間には、カム4に対してクラッチ体32が適宜中心角（回動角度） $\theta$ だけ自由回転し、その後、カム4と一体的に回転するように、カムとクラッチ体32との両者を係合するための係合手段を設ける。その1実施例として、欠歯歯車33に隣接した外周部には、前記カム4から支軸8の軸線と平行状に突出する係合突起体34が適宜回動角度 $\theta$ にわたって回動移動可能で円弧状の案内溝35を形成する。この案内溝35は、前記欠歯歯車33における欠歯部分33aの側方を含み、また、前記係合突起体34の付け根部34aが欠歯歯車33の内径側空所36を潜って通過でき、且つ前記係合突起体34が欠歯歯車33の内径側空所36から案内溝35に挿入できるように、前記欠歯部分33aを支軸8の軸線方向に沿って切り離す切り溝37が設けられている。

【0013】さらに、カム4が初期状態（図1参照）の位置にあるとき、クラッチ体32の外周に形成された係止段部38と、前記係合突起体34における係止段部34aとの両者にわたって、バネ22にて付勢された係止爪23の先端が係脱するように構成されており、また、クラッチ体32を図1の矢印R方向に回動付勢するためのばね39の一端が係合するピン40を突設している。

【0014】次に、これらの構成による動作について説明する。まず駆動モータ6が作動すると、アイドルギヤ11～20は図1の矢印方向に回転し、アイドルギヤ17を介して搬送ローラ対5a, 5bが所定の方向に回転する。図1に示す初期状態では、クラッチギヤ24と一体的に回動可能なカム部25がレバー27にて静止保持され、ばね22にて付勢された係止爪23は、前記クラッチ体32の係止段部38及びカム4の係合突起体34における係止段部34aにわたって係止しているため、クラッチ体32及びカム4は、図1及び図6の実線で示す状態に静止しており、クラッチギヤ24における欠歯歯車24aの欠歯部分及びクラッチ体32における欠歯歯車33の欠歯部分がアイドルギヤ20と対面しているため、駆動モータ6の回転力は伝達されない。

【0015】次に用紙挿入の信号が入ると、電磁ソレノイド26に電流が供給され、レバー27の下端側が吸引されてカム部25との係合が解除され、ばね28の力にてQ方向に回動付勢されているクラッチギヤ24はその欠歯歯車部24aがアイドルギヤ20と噛み合う。そうすると、カム部25は前記係止爪23を矢印S方向に押し出し、係止爪23が前記両係止段部34a, 38から外れるので、カム4及びクラッチ体32は、それぞれ、

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単独で矢印R方向への回転が可能となる。

【0016】このとき、カム4は、付勢手段31にて上向きに付勢された用紙台1における従節ローラ21にて矢印R方向に回転付勢されているから、直ちにカム4が図7及び図8の時計方向に回転し、このカム4と一体的に回転する給紙ローラ2の下面に前記用紙台1上の印刷用紙Pの上面が当接する位置(図7)で、用紙台1の上昇は停止し、カム4の回転も一旦停止する。

【0017】即ち、図8に示すように、クラッチ体32における案内溝35内にて、カム4における係合突起体34が図6に示す自由回転可能な範囲内で移動するが、この係合突起体34によりクラッチ体32を積極的に矢印R方向に押し回転することはない。略同時に、パネ39にて矢印R方向に回転付勢されているクラッチ体32が回転し、アイドルギヤ20と欠歯歯車33とが噛み合い、クラッチ体32の回転速度が一定(定常)状態となって、クラッチ体32の案内溝35の一端35aにより係合突起体34を矢印R方向に押しながら、当該クラッチ体32とカム4とが一体的に回転する(図9参照)。

【0018】このカム4と一体的に回転する給紙ローラ2に押しつけられた印刷用紙Pは、1枚だけピックアップされ、搬送ローラ対5a、5bに向かって搬送され、印刷部に搬送される。カム4が従節ローラ21を下方に押し用紙台1を下向き回転させると、給紙ローラ2と印刷用紙Pとの当接状態が解除されると共に、クラッチギヤ24、係止爪23、クラッチ体32及びカム4はそれぞれ前記の初期状態に戻って停止するのである。

【0019】このように、係合突起体34と案内溝35との位置関係から、カム4とクラッチ体32とが1回転する間に、それぞれ所定角度だけ当該両者が係合しない自由回転領域を形成することになり、付勢手段31による付勢力がアイドルギヤ20に衝撃的に作用したり、当該アイドルギヤ20を加速するような回転力を伝達することを防止できる結果、このアイドルギヤ20を介して搬送ローラ対5a、5bに回転ムラを発生させるような力が作用することがなく、従って、印刷用紙Pの搬送中に続いて用紙挿入指令を入れても、印刷部において、印刷用紙Pに印刷ムラが発生することがなく綺麗な印刷画像を得ることができる。

【0020】なお、付勢手段31の力により用紙台1に積載されている印刷用紙Pを回転している給紙ローラ2に押しつける際、印刷用紙Pと給紙ローラ2との間に発生する衝撃は、ピックアップされる印刷用紙Pがその下面側の印刷用紙Pまたは用紙台1の表面と滑ることにより吸収されるため、その衝撃は給紙機構内の動作に悪影響を及ぼさないものである。

【0021】また、前記実施例においては、給紙ローラ2とカム4とが一体的に回転するように連結したが、クラッチ体32と給紙ローラ2とが一体的に回転するように装着しても良い。さらに、前記実施例ではカム4にお

ける係合突起体34をクラッチ体32の円柱側面の中程に形成した案内溝35に臨ませたが、カム4とクラッチ体32とが動軸線上にて隣接した状態を保持できるように構成するならば、クラッチ体32の一侧に案内溝35を形成して、この案内溝35に前記係合突起体34を臨ませるように構成しても良い。

【0022】なお、クラッチ体32に初期の回転力を付与するのはばねに限らず、力が強すぎなければ、カム4側から伝達される力であっても良く、例えば、クラッチ体32とカム4との間に適度な摩擦力を生じさせる箇所を設けたり、クラッチ体32とカム4との間に適度な粘度を持つ物質を挟み込み、その粘度を利用して共回りするように構成したり、弱いパネでクラッチ体32とカム4とを連結する等の構成にして、クラッチ体32に初期の回転力を与えるようにしても良いのである。

【0023】なお、前記実施例では、初期状態において、係止爪23がカム4の係止段部34aに係合しているとき、係合突起体34の背面と案内溝35の一端35aとが当接しているため、クラッチ体32はカム4に対してR方向の回転に自由度がないので、クラッチ体32は係止段部38を省略しても、案内溝35の一端35aと係合突起体34とを介して停止している。また、その係止段部38を残して、前記実施例の動作に支障がない範囲の自由度を持たせる、例えば、前記係合突起体34の背面と案内溝35の一端35aとの間に隙間を有するように設定するようにしても良い。

【0024】

【発明の作用・効果】以上に説明したように、本発明は、印刷用紙を積載する用紙台と、その用紙台上の印刷用紙が給紙ローラに向かって接近するように用紙台を付勢する付勢手段と、この付勢力に抗し印刷用紙が給紙ローラから離間する方向に用紙台を移動させるカムと、給紙ローラから用紙送り方向下流側に設けられた搬送ローラ対と、駆動モータの回転力を搬送ローラ対及び前記カムに伝達する伝動ギヤ機構とを備え、カムの回転により用紙台を付勢手段の作用で印刷用紙が給紙ローラに接近する方向に移動させ、給紙ローラにより送り出された印刷用紙を前記搬送ローラ対に供給するように構成してなる給紙装置において、前記カムと同軸上に回転可能に設けられ、且つ前記伝動ギヤ機構における1つのアイドルギヤに噛み合う欠歯歯車を形成したクラッチ体と、前記欠歯部分がアイドルギヤと対向する位置でクラッチ体を停止する係止手段と、前記カムとクラッチ体との間に設けられ、カムに対してクラッチ体が適宜角度だけ自由回転し、その後カムと一体的に回転するように両者を係合する係合手段を設けたものであり、用紙台を下向きに押し下げているカム及びクラッチ体から係止爪が外れると、前記カムは用紙台を上向きに押圧する付勢手段の力にて自由回転する。一方、前記係止爪から静止係合を解除されたクラッチ体は、その欠歯歯車がアイドルギヤと

7

噛み合って前記カムの回転方向と同方向に回転し始める。

【0025】この場合、前記係合手段により、カムとクラッチ体とは一定区間において互いに自由回転可能で、両者が拘束されないから、カムに作用する力がクラッチ体、ひいてはアイドラギヤを介して伝動ギヤ機構に伝わることなく、従って、搬送ローラ対に対して駆動モータ側からの回転力のみが作用し、搬送ローラ対の回転ムラが発生しない。

【0026】そして、アイドラギヤとクラッチ体の欠歯歯車とが噛み合って一定角度以上回転した後は、前記係合手段により、カムとクラッチ体とは一体的に回転して、用紙台上の印刷用紙を搬送ローラ対に向かって搬送するように給紙ローラが1回転して後、このクラッチ体は係止手段にて停止するので、元の静止状態に戻るのである。

【0027】このように、本発明によれば、用紙台を給紙ローラ方向に押しつける付勢手段の付勢力がカムにのみ作用し、クラッチ体には作用しないから、給紙作動ごとに前記付勢力により、伝動ギヤ機構に脈動する外力や衝撃力が作用せず、搬送ローラ対の回転ムラを無くすることができて、印刷画像の乱れを発生させないようにし、良好な印刷結果を得ることができるという効果を奏するのである。

【図面の簡単な説明】

【図1】本発明の1実施例における側面図である。

【図2】概略平面図である。

【図3】カムとクラッチ体との組付け状態における斜視図である。

【図4】カムとクラッチ体の一部切欠き平面図である。

8

【図5】図4におけるV-V線矢視図である。

【図6】図3のVI-VI線矢視断面で示す作用説明図である。

【図7】係止爪の係止解除直後の状態を示す要部拡大側面図である。

【図8】図7の状態におけるカムの係合突起体とクラッチ体の案内溝との位相関係を示す図である。

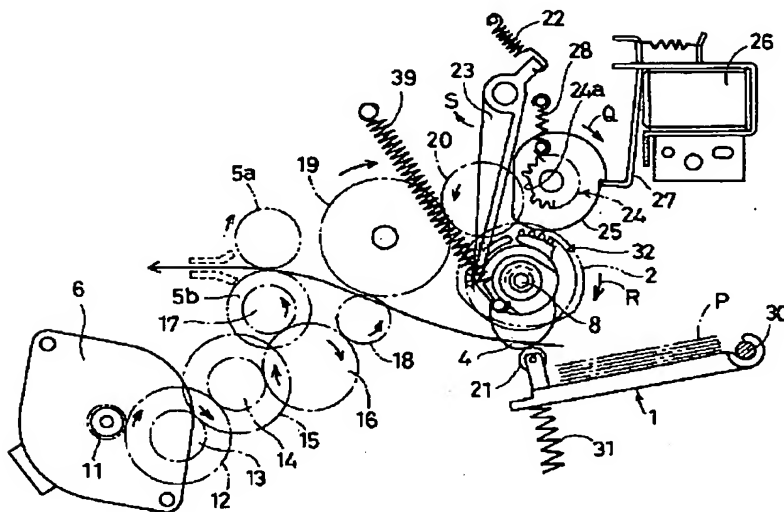
【図9】カムとクラッチ体とが一体的に回転する状態を示す要部拡大側面図である。

【図10】従来技術の側面図である。

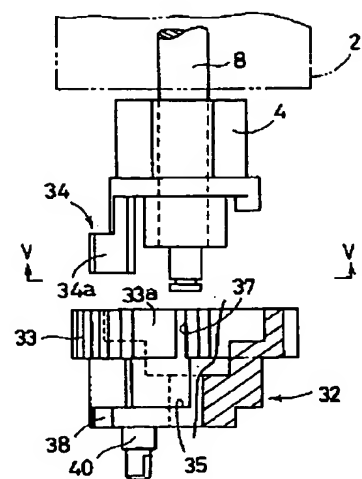
【符号の説明】

1	用紙台
2	給紙ローラ
4	カム
5 a, 5 b	搬送ローラ対
6	駆動モータ
7	伝動ギヤ機構
2 1	従節ローラ
2 3	係止爪
2 4	クラッチギヤ
2 5	カム部
2 6	電磁ソレノイド
2 7	レバー
3 1	付勢手段
3 2	クラッチ体
3 3	欠歯歯車
3 4	係合突起体
3 5	案内溝
3 4 a, 3 8	係止段部

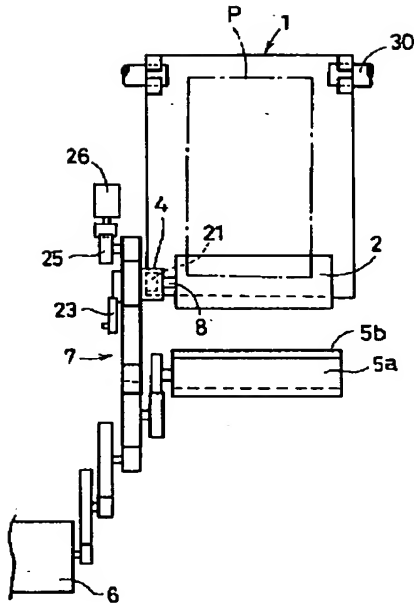
【図1】



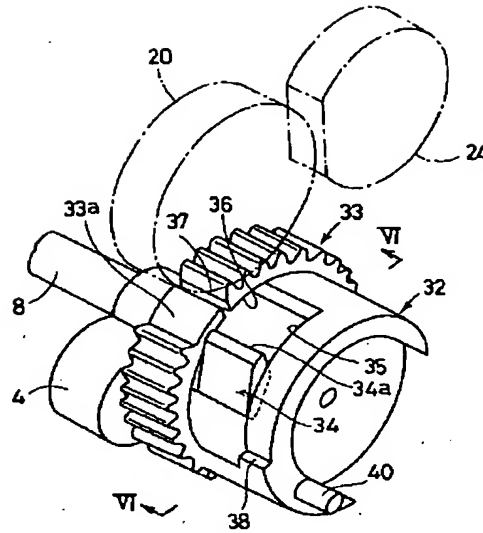
【図4】



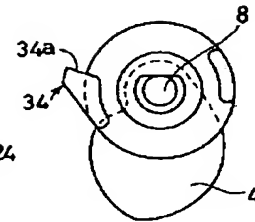
【図2】



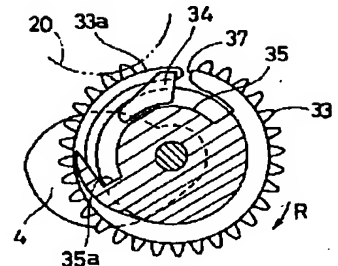
【図3】



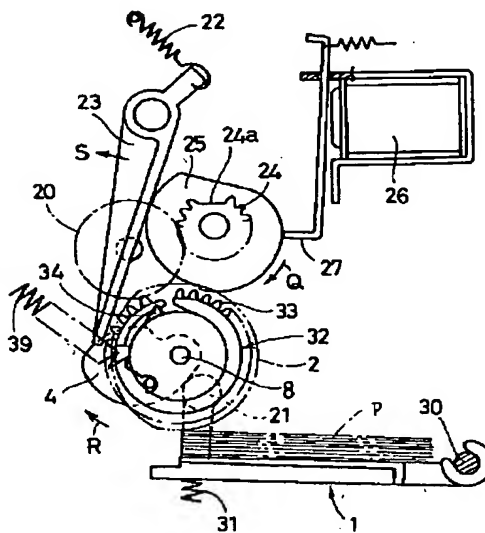
【図5】



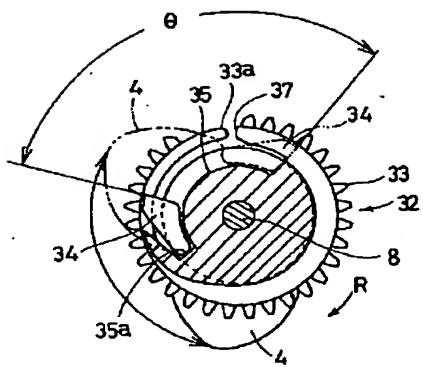
【図8】



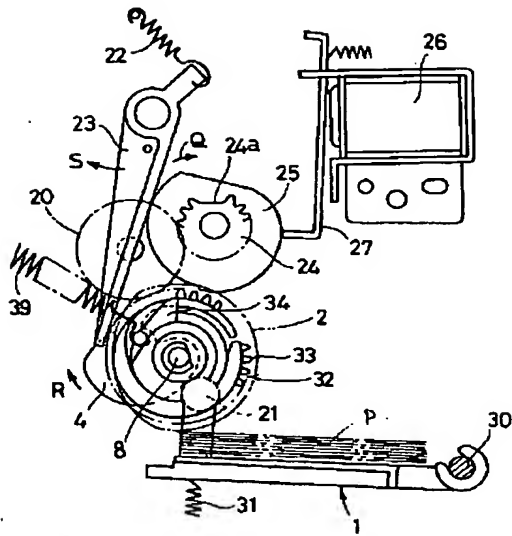
【図7】



【図6】



【図9】



【図10】

